

"user friendly"
educational software
1-4 Players, Ages 14 and up
carefully tested
in the classroom
excellent for home study

AMERICAN HISTORY*

The Decades Game 3

5 computer programs designed
as games to let you learn
historical facts about America's
history and when they occurred.
*Look for the other titles in this series

BRAINWARE™ KIT

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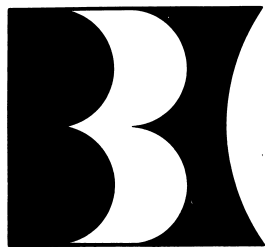


BRAINBANK LEARNING GUIDE

(History U.S.A.)

AMERICAN HISTORY
THE DECADES GAME 3





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AMERICAN HISTORY THE DECADES GAME 3

For 1 to 4 players: Ages 14 and up

**Five computer programs designed as games
to let you learn facts about America's history**

**Written by Charles S. Goldstein
Computer Graphics by Paul Kuhrman
Program Edited by Mark Feldman**

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220 Fifth Avenue, New York, N.Y. 10001
212-686-6565**

Look for other titles in this series.

***The material in this Learning Guide may be reproduced for classroom use.*

About this BRAINWARE™

BRAINBANK'S DECADES GAME teaches that there were multiple and quite disparate images in each decade of American History. The game provides an educational, informational, motivational tool for learning, and adds both challenges and fun to memorizing historical facts.

Today's "living present" becomes tomorrow's history. We have only to read the daily newspapers to know that historical events happen to real people and that nothing occurs in timeless isolation. When the "Wild West" was thriving, there was also a lot happening "back East". The same year that Custer led his men into battle along the banks of the Little Bighorn, Alexander Graham Bell patented his telephone, baseball's National League was formed and Mark Twain published his classic, *The Adventures of Tom Sawyer*.

The DECADES GAME is simple to run and fun to play. Even those who don't know when the War of 1812 took place, or who is buried in Grant's Tomb, can become history buffs. The events mentioned in the game span our history from the opening shot of the American Revolution to the opening shot of the Space Age.

Players are asked to place events in America's politics, economics, technology, science, folklore and art in their proper decades.

The Decades Game 3

There are five games in AMERICAN HISTORY: THE DECADES GAME 3. Any one of the five games may be played first; they do not have a sequence. Four to eight rounds can make up a game; the number of rounds is the player's choice.

****The instructions for running the program are shown ON-SCREEN throughout the game. The rules for playing the game are also presented ON-SCREEN at the beginning of each game; once learned, however, they can be skipped. They are printed here for your reference.**

CONSULT YOUR COMPUTER MANUAL FOR START-UP INSTRUCTIONS.

Rules For Playing The Decades Game

(Directions needed for playing THE DECADES GAME appear ON-SCREEN during the game.)

BE SURE TO LOAD THE GAME DISKETTE ACCORDING TO THE INSTRUCTIONS IN YOUR COMPUTER MANUAL. IF YOU HAVE AN APPLE IIe, BE SURE THE "CAPS LOCK" IS DOWN.

— You will be asked how many people will play the game. As many as four people can play at one time, or you can play alone. Enter the number of players and press "RETURN".

(After the rules have appeared on the screen, each player will be asked to type in his or her initials.)

— You will then be asked how many rounds of the game you wish to play. You may choose from 4 to 8 rounds.

These are the *rules*, which will also appear ON-SCREEN.

- An event will be displayed.
- Each player, in turn, may then either enter the decade in which the event occurred or PASS.
- To answer, enter the *first* year of the DECADE in which the event occurred.
For example: for 1783, type 1780;
for 1907, type 1900, etc.
- To pass, type 0. (A pass is no score.)
- A right answer scores 5 points.
- A wrong answer loses 2 points.
- Each player has a turn before scores are tallied.
- If any player has entered the right decade, the next round starts.
- If no player answers correctly, a second event from the same decade appears and each player may again answer or pass.
- A correct answer to the second event scores only 4 points.
- This sequence will continue through a third and fourth event, if necessary.
- For each succeeding event displayed, correct answers will be worth one point less.
- If no player has entered a correct decade after the fourth event has appeared on the screen, the computer will display the exact date of each event, tally the score and advance to the next round.
- The same decade may appear twice in one game.
- It's your turn to play when your initials appear.
- REMEMBER: Players lose 2 points for a wrong answer.

When you have finished playing the game wait for the light to go out on the disk drive, then carefully remove the diskette and replace it in its protective jacket before you turn your computer OFF.

Alaska is not
drawn to
scale.



Learning Guide

This Learning Guide is provided to augment the courseware with related information, exercises and activities.



Each star on this map represents the state in which a President was born.

The history of the United States has in great measure been shaped by the person at the helm. The Chief Executive is at the center of federal authority: determining foreign and domestic policy, appointing government officials, taking emergency measures in labor-management conflicts that threaten the national safety, coordinating agencies, enforcing federal laws — and usually opening each baseball season by throwing out the first ball! The office of the President is a focus of popular attention and has a luster not generally enjoyed by those in legislative or judicial positions.

A candidate for the presidency must have lived in the United States for at least 14 years, be at least 35 years old and be a natural-born citizen. The President is nominated by a national political party convention and elected by a majority vote of the Electoral College. The President is elected for four years and is eligible for a second four-year term. Presidents may not serve more than two terms. Women are equally eligible for the office as are men, though tradition has been an obstacle.

The United States Constitution provides for presidential succession. If the President dies or is unable to carry out the duties of office, the Vice-President assumes the duties and powers of the President and nominates a new Vice-President who takes office upon confirmation by a majority vote of both houses of Congress. (There are no provisions for determining under what circumstances a President may be considered temporarily or permanently unable to discharge his duties.)

If a President-elect dies before beginning the term, then the Vice-President-elect becomes President. If both should die or become disqualified, succession is determined by the Presidential Succession Act. This provides for assumption of the presidency by government officials in this order: Speaker of the House; president pro tempore of the Senate; Secretary of State; Secretary of the Treasury; Secretary of Defense; Attorney General; Secretary of the Interior; Secretary of Agriculture; Secretary of Commerce; Secretary of Health, Education and Welfare; Secretary of Housing and Urban Development; Secretary of Transportation.

Geography has by no means entered into the choice of President. The fifty states have not taken turns providing a President. Most of them have come from populous, industrial states.

Brainware Facts

PRESIDENTS	Year Of Birth	Birthplace	Political Party	Age at Inaugu- ration	Served	Vice-President
1. George Washington	1732	VA	1. Federalist	57	1789-1797	John Adams
2. John Adams	1735	MASS	2. Federalist	61	1797-1801	Thomas Jefferson
3. Thomas Jefferson	1743	VA	3. Democratic- Republican	57	1801-1809	Aaron Burr George Clinton
4. James Madison	1751	VA	4. Democratic- Republican	57	1809-1817	George Clinton Elbridge Gerry
5. James Monroe	1758	VA	5. Democratic- Republican	58	1817-1825	Daniel D. Tompkins
6. John Quincy Adams	1767	MASS	6. Democratic- Republican	57	1825-1829	John C. Calhoun
7. Andrew Jackson	1767	SC	7. Democrat	61	1829-1837	John C. Calhoun Martin Van Buren
8. Martin Van Buren	1782	NY	8. Democrat	54	1837-1841	Richard M. Johnson
9. William H. Harrison	1773	VA	9. Whig	68	1841	John Tyler
10. John Tyler	1790	VA	10. Whig	51	1841-1845	—
11. James K. Polk	1795	NC	11. Democrat	49	1845-1849	George M. Dallas
12. Zachary Taylor	1784	VA	12. Whig	64	1849-1850	Millard Fillmore
13. Millard Fillmore	1800	NY	13. Whig	50	1850-1853	—
14. Franklin Pierce	1804	NH	14. Democrat	48	1853-1857	William R. King
15. James Buchanan	1791	PA	15. Democrat	65	1857-1861	John C. Breckinridge
16. Abraham Lincoln	1809	KY	16. Republican	52	1861-1865	Hannibal Hamlin Andrew Johnson
17. Andrew Johnson	1808	NC	17. Nat'l Union	56	1865-1869	—
18. Ulysses S. Grant	1822	OH	18. Republican	46	1869-1877	Schuyler Colfax Henry Wilson
19. Rutherford B. Hayes	1822	OH	19. Republican	54	1877-1881	William A. Wheeler
20. James A. Garfield	1831	OH	20. Republican	49	1881	Chester A. Arthur
21. Chester A. Arthur	1830	VT	21. Republican	50	1881-1885	—
22. Grover Cleveland	1837	NJ	22. Democrat	47	1885-1889	Thomas A. Hendricks
23. Benjamin Harrison	1833	OH	23. Republican	55	1889-1893	Levi P. Morton
24. Grover Cleveland	1837	NJ	24. Democrat	55	1893-1897	Adlai E. Stevenson
25. William McKinley	1843	OH	25. Republican	54	1897-1901	Garret A. Hobart Theodore Roosevelt
26. Theodore Roosevelt	1858	NY	26. Republican	42	1901-1909	— Charles W. Fairbanks

PRESIDENTS	Year Of Birth	Birthplace	Political Party	Age at Inaugu- ration	Served	Vice-President
27. William H. Taft	1857	OH	27. Republican	51	1909-1913	James S. Sherman
28. Woodrow Wilson	1856	VA	28. Democrat	56	1913-1921	Thomas R. Marshall
29. Warren G. Harding	1865	OH	29. Republican	55	1921-1923	Calvin Coolidge
30. Calvin Coolidge	1872	VT	30. Republican	51	1923-1929	Charles G. Dawes
31. Herbert C. Hoover	1874	IO	31. Republican	54	1929-1933	Charles Curtis
32. Franklin D. Roosevelt	1882	NY	32. Democrat	51	1933-1945	John N. Garner Henry A. Wallace Harry S. Truman
33. Harry S. Truman	1884	MO	33. Democrat	60	1945-1953	Alben W. Barkley
34. Dwight D. Eisenhower	1890	TX	34. Republican	62	1953-1961	Richard Nixon
35. John F. Kennedy	1917	MASS	35. Democrat	43	1961-1963	Lyndon B. Johnson
36. Lyndon B. Johnson	1908	TX	36. Democrat	55	1963-1969	— Hubert H. Humphrey
37. Richard M. Nixon	1913	CA	37. Republican	56	1969-1974	Spiro T. Agnew
38. Gerald Ford	1913	NE	38. Republican	61	1974-1977	Nelson Rockefeller
39. Jimmy Carter	1924	GA	39. Democrat	53	1977-1981	Walter Mondale
40. Ronald Reagan	1911	IL	40. Republican	70	1981-	George Bush

Brain Teasers

Two groups of five historical facts are presented in the following section of this Learning Guide. There are two events in each group which happened in the same decade. These facts can be reproduced for student exercises. Here, the events which occurred in the same decade are *italicized*. Information about the listed events can be found in an encyclopedia.

From each group of five, select the two events that happened in the same decade.

1830's

- John Brown leads a raid on the federal arsenal at Harper's Ferry.
- The law requires that the motto 'E PLURIBUS UNUM' appear on one side of every U.S. coin that is minted.
- *The Democratic party meets in Baltimore for its first national convention.*
- The first macadam road is laid in the U.S.
- *Oberlin Collegiate Institute becomes the first coeducational college in the U.S.*

1800's

- West Virginia is admitted to the Union.
- *Lewis and Clark Expedition sets out for the Pacific Northwest.*
- *The War with Tripoli ends and the Barbary pirates agree to respect the United States flag.*
- Spain formally transfers Florida to the United States.
- Congress establishes 4 standard time zones in the U.S.

The BRAINBANK Inc., BRAINWARE™ KIT CONTENTS

A BRAINWARE™ KIT BOOKLET

Everything you need to know about BBI BRAINWARE™

- **BOOKLET CONTENTS**

A table of contents with page numbers.

- **THE BBI PRIMER**

Instructions for interacting with our BRAINWARE™.

- **THE MICROCOMPUTER: An Overview**

Parts of a microcomputer explained in simple terms.

- **“SIGHT-SAYING”**

A pronunciation guide.

- **GLOSSARY**

Definitions of commonly used computer terms.

- **LEARNING GUIDE**

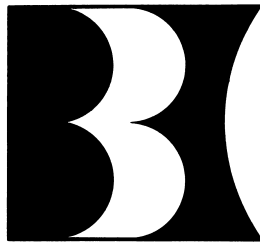
Related information and activities.

BRAINWARE™ CONTENTS

Listed on the package for quick reference.

THE BRAINWARE™

BBI lessons on diskette in packages designed for careful storage.



“USER FRIENDLY SOFTWARE”

NOTES

NOTES

BRAINWARE™ KIT BOOKLET



BRAINBANK courseware is written by experienced teachers. The text and its presentation are carefully created to hold interest.

BRAINBANK packaging is practical. It is designed to be stored vertically. Vertical storage is not only a space saver, it protects the stored material and adds to diskette and cassette life.

All **BRAINBANK** lessons are duplicated on the best quality recording materials.

Clearly-labelled diskettes should be kept in the specially-treated "portable" jackets and tucked inside the **BRAINWARE™** KIT unless they are in use in a disk drive.

Following this procedure makes it unlikely that the courseware will be misplaced or separated from its storage place.

BRAINBANK lessons on diskette can be used in any order (though it is recommended that users RUN the tests last). **BRAINBANK** lessons on diskette are programmed to be "menu-driven." This enables any program on the diskette to be LOADED by typing just one key, rather than typing a command and a title for the lesson as is usually done.

Every **BRAINBANK** lesson is a vivid and guided educational experience. **BRAINBANK** creates adventures in learning.

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BRAINWARE™

Booklet Contents

THE BRAINWARE™ PRIMER **A**

Detailed instructions for interacting with BBI courseware.

"SIGHT-SAYING" **B**

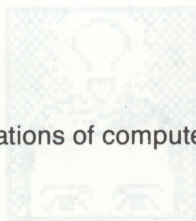
A word pronunciation guide

THE MICROCOMPUTER: AN OVERVIEW **C**

Parts of the microcomputer made simple.

GLOSSARY **D**

Definitions and pronunciations of computer terms.

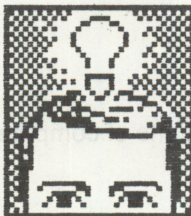


THE MICROCOMPUTER... LEARN FROM IT!

"At last! We—you and I, everybody—are really in the computer age! With the arrival of the personal computer, we have progressed to a world . . . in which we can all learn to control a computer and use its vast capabilities to enhance our lives. . . . The computer is the most versatile, powerful, useful, exciting learning tool in history. Everyone who can learn, can learn with it . . . (and) . . . benefit from the computer's speed, accuracy, versatility, (and) discipline. . . . The computer . . . is a dynamic and actively involving medium that engages students on multiple levels. . . . Its programmable traits of patience, motion, change, interaction, individual responses, and even playfulness, offer new learning opportunities. . . . Here is a machine to attract the spirit, spontaneity, and appreciation of novelty that is in all of us. . . .

The advantages of computer learning are numerous. A computer is infinitely patient. Users can work at their own pace. Feedback can be immediate. Learners can know how they are doing while they are doing it. And, it's fun and easy to use. Learning at a computer is low risk. Mistakes are a matter between the individual and the machine. . . . Learning takes effort, but it is much easier when motivation is high. . . . and the microcomputer can deliver high-quality instruction in manageable bits of information . . . building confidence as it provides success and excitement.

Consumers are catching on to the true potential of microcomputers. The computer society has arrived. . . . You don't have to learn about or understand electronics or develop programming skills to use . . . or benefit from microcomputers. . . . Just push a button, follow the instructions on the display screen and presto! Everyone is a computernik, touching tomorrow's technology today."



THE BRAINBANK PRIMER

BRAINBANK lessons are wonderful. There are at least five lessons in every **BRAINBANK** diskette or cassette title. But you cannot work with them unless the computer is on. First the program must be LOADED into the microcomputer's memory.

Directions for LOADING your computer are included in your microcomputer manual.

TWO-WAY SIGNALS

A microcomputer exists to interact with you. Unlike a person, however, a microcomputer can only do as it is told. For all its wizardry, a computer does nothing without you, so you must command it to do something.

Usually a verb, such as LOAD or RUN, is used for a command. A command is typed on the keyboard.

THE "RETURN" KEY: As you type a command on the keyboard, it will appear on the screen. You let the computer know that you are finished with your entry, whether a command or a response, by pressing the "RETURN" key.

THE CURSOR: When the microcomputer finishes doing what you commanded, it will flash its cursor—a small, lighted square box on its screen. When the cursor appears, the computer wants you to do something. When it disappears, the microcomputer is doing something.

Remember: You press the "RETURN" key to have the microcomputer respond to you; the microcomputer will flash its cursor to have you respond to it.

GETTING YOUR ATTENTION

To attract your attention somewhere on a screen, **BRAINBANK** lessons sometimes underline information, sometimes flash information, and/or sometimes highlight information.

Highlighted information is reverse print—dark letters on a light background.

QUESTIONS AND ANSWERS

BRAINBANK lessons will ask you questions. Do not type an answer until the cursor flashes. If you type a response before the computer "asks" for it, it will be treated as a wrong answer even if it is right! The microcomputer is too busy to "hear" you until it flashes its cursor.

However, when the cursor does flash, you may take all the time you need to answer.

And don't forget—the computer will not know you are finished answering until you press the “RETURN” key.

When a question is answered correctly, **BRAINBANK** courseware responds with a highlighted comment on the lower left portion of the screen.

When a question is NOT answered correctly, **BRAINBANK** courseware also responds on the lower left portion of the screen. However, the comment will not be highlighted.

If the response is NOT correct, **BRAINBANK** courseware may give a hint, or give the answer, or suggest another choice be tried.

In some lessons, **BRAINBANK** courseware will work out an example to illustrate how you should respond to questions.

Check your answer on the screen as you type it on the keyboard. If you discover a typing or other error, correct it before you press “RETURN.” Instructions on deleting or backspacing in order to “erase” a mistake can be found in the microcomputer manual.

Occasionally, **BRAINBANK** questions require “yes” or “no” for an answer. The computer will instruct you to “Type Y or N” to make this response.

A space between letters or words on a microcomputer's screen may be nothing to you, but it is something to a microcomputer—a character. Therefore, if you have a blank space in or after your answer, the microcomputer considers that answer misspelled. Microcomputers are just that fussy!

Unless the microcomputer gets specifically what it is programmed to look for in a response, it will either indicate an error or not react at all. The microcomputer demands that you follow instructions exactly, that you spell correctly and that you command it clearly.

Probably you will end up loving it for its insistent emphasis on precision. And you'll never have to wonder who is responsible for a mistake. It won't be the microcomputer.

MOVING RIGHT ALONG

On a microcomputer you “turn a page” by advancing the screen. While some screen displays on **BRAINBANK** lessons, such as the title screen, are timed to advance by themselves, most **BRAINBANK** screens enable the user to determine the amount of time needed.

The microcomputer will wait for you indefinitely, without commenting, advising you to

TYPE ANY LETTER TO CONTINUE

when you are ready. Do just that and you'll move ahead. Type any letter at all.

(Yes, any letter! Try them. They all work.) Or, press the long narrow bar at the bottom of the keyboard. (This is the space bar.)

If the microcomputer does not give you instructions, you know the program will advance automatically.

BRAINBANK lessons on a cassette or diskette do not have to be used in any order. No lesson is a prerequisite for any accompanying lessons. However, it is expected that users will RUN through the Review Test program last as it measures comprehension of the other lessons.

Make sure you will have enough time to complete a lesson before you begin. You cannot pick up where you "left off" and you cannot start a lesson in the middle.

If you should wish to stop a **BRAINBANK** lesson in progress, NEVER turn off a Commodore computer with a diskette in a disk drive. First remove the diskette and place it in its "portable" jacket, then store it in the **BRAINWARE™** KIT, then turn off the microcomputer.

The Apple may be turned off with a diskette LOADED in the drive.

Never turn off the microcomputer with a cassette in the tape deck and the PLAY key depressed. Rewind the tape to its beginning. Depress the STOP EJECT key and remove the cassette and place it in its storage form inside the cover of the **BRAINBANK** KIT.

The on/off switch for the microcomputer is located on its back panel in the lower left.

Alas, **BRAINBANK** lessons do come to an end. Shortly after "LESSON COMPLETE" appears on the screen, the menu will be re-presented.

To proceed to the next lesson, type the letter or the number of the one with which you want to work.

To stop, turn the computer off.

CARE OF CASSETTES AND DISKETTES

A cassette is a cartridge containing magnetic recording tape. Information can be stored and erased on this magnetic tape. The cassette is designed to be inserted into a tape deck. The surface of the magnetic tape should not be touched. It is best to rewind the tape to its beginning before removing the cassette from the tape deck. Store cassettes away from heat and any source of magnetism such as running motors, etc.

A diskette is a small coated plastic disk. Information can be stored on and erased from its surface. The diskette is permanently packaged in a square black plasticized cover which protects it and helps keep it clean.

The surface of the diskette should never be touched. Though the diskette is flexible and often termed a "floppy," bending it will damage it. Avoid scratching a diskette, placing it on a dirty or greasy surface or letting it collect dust.

A diskette is fragile and should remain in its protective jacket when it is not being used in the disk drive.

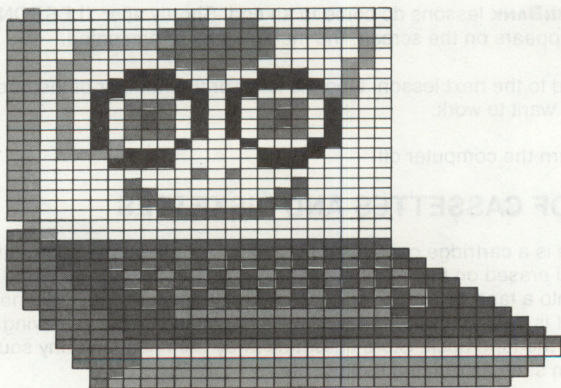
Diskettes are sensitive to extremes of temperature. Keep them out of the sun and away from heat which can cause them to warp and/or lose data. Beware of car trunks and dashboards when the temperature is high!

A magnetic field can distort information stored on diskette or cassette. Therefore, keep them away from magnetic fields, which are created by electronic equipment, recorders and other sound-reproducing equipment, and running motors, such as in vacuum cleaners, etc.

BE A BRAIN

When your microcomputer lets you know that the **BRAINBANK** lesson is in its memory, be ready for a dialogue with your microcomputer and an adventure in learning.

Give your computer a reason for being: Buy **BRAINWARE™** by **BRAINBANK!**



"SIGHT-SAYING" A Pronunciation Guide

BRAINBANK has created its own consistent pronunciation guide because the microcomputer does not have phonetic symbols on its keyboard.

Throughout **BRAINBANK** lessons, words constructed from these phonemes will appear in parenthesis on the display screen as a guide to correct pronunciation.

The syllable that should be accented is either highlighted or underlined.

	PHONETICS DICTIONARY BRAINBANK
BANANA, COLLECT, ABUT	ə UH
OPERATION, FURTHER, TERM	ər UHR
BIENNIAL	ă UH
MAT, SNAP, GAG	a AAH
DAY, FADE, CAPE	ā AY
HOT, BOTHER	ä AH
NOW, LOUD, OUT	au OW
BABY, CRIB	b B
CHIN, NATURE (t + sh)	ch CH
DID	d D
BED, PECK, PET, SAID	e EH
BLEED, EVEN, EASY, MEET	ē EE
FIFTY, CUFF, <u>TOUGH</u>	f F
GO, GET, GIFT	g G
HAT, AHEAD	h H
WHALE, WHILE	hw HW
TIP, BANISH, ACTIVE	i IH
BUY, SIGH, SITE, <u>TRIPLE</u>	ī Y
JOB, EDGE, JUDGE	j J
KIN, COOK, ACHE	k K
LID, POOL	l L
MURMUR, MUM, DIM, NYMPH	m M

NO, OWN	n	N
THING, FINGER	ŋ	NG
BEAU, KNOW, TOE	ō	OH
ALL, CAUGHT, GNAW, SAW	ô	AW
COIN, DESTROY, NOISE, SAWING	oi	OY
PEPPER, LIP, POP	p	P
RED, CAR, PARITY, ROAR	r	R
SOURCE, SAUCE, LESS	s	S
DISH, SHY, MISSION	sh	SH
TILE, ATTACK, TRAPPED	t	T
THIN, ETHER	th	TH
THEN, EITHER, THIS	th	THH
RULE, TOOL	ü	OO
PULL, WOOD, BOOK	û	UH
CUT	ũ	UHH
URGE, WORD (see er)	ûr	UHR
VIVID, GIVE	v	V
WE, AWAY, WITH	w	W
YARD, YES	y	Y
YOUTH, UNION, FEW, CUE	yü	YOO
CURABLE, FURY	yû	YUH
RAISE, ZONE, ZEBRA	z	Z
AZURE, VISION, GARAGE	zh	ZH

Sometimes a schwa sound is represented by an apostrophe.

For example: bicentennial BY SEHN TEHN EE 'L

able AY B'L

THE MICROCOMPUTER: ON OVERVIEW

The Hardware: Getting Acquainted

A microcomputer can help you do a great many things. Learning to use it places miraculous power at your fingertips. However, microcomputers are not “intelligent” and cannot “think.” They only will do exactly *what some human has instructed (programmed) them to do*, never more, never less.

Befriending your microcomputer requires a mutual relationship based on strict, unyielding discipline, accuracy and precision. Microcomputers must be instructed in the language they understand—and they do not understand body language, temper tantrums or obscenities!

While microcomputers come in many shapes and sizes, they all have or use similar basic parts (hardware): a central processing unit, memory, input/output devices, and input/output interfaces. Software (programs) makes the hardware work for you.

The Central Processing Unit (“CPU”)

Sometimes called a microprocessor, the CPU is the brain of the microcomputer. A tiny electronic circuit contained on a chip, the CPU not only performs various operations and calculations, but it directs and coordinates other parts of the microcomputer to perform the work it has been instructed to do.

The CPU has built-in instructions specified and installed by the manufacturer. These instruction sets, which vary among different brands of microcomputers, make it possible for the microcomputer to work, accept commands, calculate, etc. The microcomputer never forgets these instructions, and generally they cannot be changed, except by experts.

One of the most important features of the CPU is its ability to interpret a language with which it will interact with humans, most commonly BASIC (Beginners All-Purpose Symbolic Instruction Code). Each microcomputer manufacturer uses a somewhat different version of BASIC, which is why a cassette or diskette programmed for one brand of microcomputer cannot be understood by (interpreted by the internal instruction set of) another brand of microcomputer.

The CPU must be furnished with instructions for the operation it is asked to do, plus information on where to get the data on which to operate, and where to put the result when the operation is complete. Required information and instructions are furnished through other parts of the microcomputer, as explained further on.

Memory

Since a CPU works on instructions sequentially, there must be a place for further instructions to be stored while a prior instruction is being worked on. The memory of a computer is its storage place. Programmed instructions are stored in the memory. As the CPU completes each instruction, it fetches another from the memory.

Microcomputers have at least two kinds of memory: Random Access Memory (RAM), and Read Only Memory (ROM).

RAM is temporary storage. It is possible to "write" into this memory: adding, changing, or deleting information in parts or all of a program. The new or altered program material can then be transmitted to diskette or cassette and stored outside the microcomputer for future reference. Without having to go through all the other stored information, any information (a word, a group of words, or more) in Random Access Memory may be accessed (referenced, deleted or changed).

Random Access Memory content remains in the microcomputer only for as long as the power remains on. If the power to the machine is turned off, the memory content is lost. You must either "SAVE" the program onto a storage medium (diskette or cassette) or leave the microcomputer on—memory chips use very little power.

RAM is measured in "K." The more K the more memory. For example, a 32K program contains approximately twice the content of a 16K program. By the same token, a 32K microcomputer can accept approximately twice as much information as a 16K machine.

ROM is memory contained on a circuit that is installed by the manufacturer or user. Like RAM, it is measured in K. Unlike RAM, it is permanent memory, unaffected by a power interruption. ROM memory can be prepared by the manufacturer to a user's specifications.

Input/Output Devices

The human brain needs its senses and the parts of its body to both receive and communicate information. Human senses input data into the brain. The body parts then respond to what the brain directs. This resulting activity is the human brain's output. Input/output devices (I/O for short) are the senses of the microcomputer.

Input devices are connected to a microcomputer, and translate their information into signals that the microcomputer can interpret. Output devices translate the microcomputer-generated signals into a language understood by humans.

I/O devices allow microcomputers not only to communicate ("interface") with humans, but with other machines as well.

Several I/O devices common to the microcomputer are:

The Keyboard

The keyboard is an input device and resembles that of a typewriter. It has keys for each character of the alphabet, for each numeral and for punctuation marks and other commonly-used symbols. Each key is actually a switch that causes electronic circuits to produce a binary digit pattern that can be sent to the microcomputer in a form it recognizes.

The symbols on the microcomputer keyboard can have more than one meaning to the microcomputer, depending on how they are used. To create your own programs, you need to learn these alternate meanings. You need not know them to use prepared software.

Video Display

The screen on a microcomputer uses a cathode ray tube (the CRT), the same type of tube as a television screen. In fact, several brands of microcomputers can use television screens for this purpose. The CRT is an output device. It displays the microcomputer's internal activity. While it also displays the user's requests, it has no part in inputting information to the microcomputer.

Magnetic Tapes and Disks

The human memory has limits to the amount of information it can hold at any time. We use "secondary" or outside storage to keep and reference information, such as notes, pictures, recordings, etc. Diskettes and cassettes are the microcomputer's form of secondary memory to store information which is beyond the K capacity of the microcomputer.

Diskettes look like 45-RPM phonograph records without grooves and with a permanent surrounding jacket which must never be removed. Storage is accomplished by recording binary information (0's and 1's) magnetically. Magnetic tape is in the familiar format of the audio cassette. In fact, audio cassette recorders can be interfaced with a microcomputer for receiving or storing program information. Again, information is recorded on a cassette magnetically.

Diskette storage's primary advantage over cassette storage is that the "head" in the disk drive which reads or writes information on a diskette, can be positioned so that any information is immediately accessible, regardless of where it may be stored physically on the surface of the diskette. Since cassette tapes are wound onto reels, the information they contain is available only in a sequential manner and the microcomputer must read through all the information preceding the desired data before it may be accessed. This process is quite time-consuming compared to the immediate conveyance of information from a diskette. The advantage to cassettes, however, is the lower cost of the I/O equipment necessary for their use.

Modems

A modulator encodes information into transmittable form. A demodulator decodes incoming information. A modem, therefore, is a device to send and to receive information to and from a computer.

Modems are used to access a computer via telephone lines. The modem converts the information to be transmitted into a series of audio tones played into a telephone. The modem at the receiving end then reconverts (demodulates) the signals into computer-readable form.

Interfaces

I/O interfaces are the link between the CPU and the I/O device. They provide the controls to allow the computer and its peripheral devices to interact correctly. The tasks performed by these devices include: starting and stopping an I/O device (printer, tape recorder) at the command of a program, determining the operational readiness of an I/O device to be used at a given point in a program, storing information signals in a buffer temporarily until the computer is ready to handle it, modifying information from the computer in some way to make it useable by an I/O device, controlling the timing of information transfers: allowing all the information to be sent at once or requiring it to be sent serially, keeping note of where a program has been interrupted, providing the user with status information on the I/O device to which it is connected without going through the Central Processing Unit.

GLOSSARY

Computer Terms

alphanumeric (ăi fe nōō mēr ĭk). A description of a set of symbols on a computer that combines letters, numbers, and special characters.

examples: A\$, A2, A(02), FOR 1 = 1 to 10.

backup diskette. A duplicate diskette kept in case the original is destroyed accidentally.

BASIC (bā sik). "Beginners All-Purpose Symbolic Instructional Code" is the programming language of most microcomputers.

binary (bī n ə rē). Having two possible choices.

binary code. A code that makes use of only the two characters 0 and 1.

binary digit (bit). A single unit represented by either of the digits, 0 or 1.

branch (brānch). To select one from a choice of two or more sets of computer instructions.

bug (bŭg). A mistake in a computer program.

byte (bīt). Eight binary digits that operate as a unit and represent an alphanumeric character. A byte is the smallest addressable unit in a microcomputer system.

example: "A," the first letter of our alphabet, is represented within the computer as the byte: 01000001

cassette tape. Magnetic tape on which the computer can store information with electronic signals.

cathode ray tube (CRT). A television-type picture tube that displays characters and/or graphics by lighting up dots.

central processing unit (CPU). The "brain" which controls and supervises the whole computer.

character (kă ĭ ĭk tər). Any symbol that you can type on the keyboard.

command (ka mănd). An instruction to the computer to perform a task.

computerese (kəm pyōō tər ēz). New words and new definitions of old words as they apply to computers. The words in this glossary.

core (kôr). The place where information is stored in the computer. Also called main storage or memory.

courseware (kôr swâr). A kind of software designed to instruct. Educational computer material.

cursor (kûr sâr). A movable character displayed on a computer screen³ indicating where the next character will be displayed.

data (dā tē). Information the computer acts on when a program RUNS; Everything you input to the computer.

debug (dē būg). To find and remove mistakes from a computer program.

disk drive. Mechanism for holding a diskette; The drive is a device that rotates the diskette.

diskette (diš kět). A thin, flexible, plastic disk in a permanent protective jacket that stores information; The information has been "written" on its surface magnetically by computer signals sent to a disk drive.

display (diš plā). Pictures and words that appear on a display screen.

display screen. The part of the computer where information appears; The cathode ray tube.

enter (ēn tēr). To type information into the computer.

floppy disk. Same as a diskette.

hard copy. A printed paper copy of a computer program or report. A printed paper copy of images that appear on the display screen. Also called a printout.

hardware (hārd wâr). The computer machinery, as opposed to the computer programs (the software).

head (hēd). An electro-magnetic device on a cassette recorder or a disk drive that reads, writes, records or erases information supplied by a computer.

input (in pōōt). Information given to a computer through a keyboard or other peripheral device.

interface (īn tēr fas). Communication between two computer components.

I/O. Input and output; The device used to transmit information into the computer or the device used to transmit information from the computer to the "outside" world

K. 1,024 bytes; Also called core, memory, or main storage; An abbreviation for the unit "kilobyte." Computers hold a specific amount of K. Many computers allow for more K to be added.

keyboard (kē bōrd). A set of keys on which to type information or instructions for the computer.

keystroke (kē strōk). The typing of one letter, number, or symbol on the keyboard; Typing one alphanumeric character.

listing (līs ting). A hardcopy of programs or data.

load (lōd). To take information from storage, such as a diskette or a cassette, and put it into the computer.

loop (lōōp). Part of a computer program that repeats a given number of times.

main storage. See storage.

megabyte (mēg ə bit). One million bytes.

memory (mem ə r ē). See storage.

menu (mēn yōō). A list of choices on the screen from which a selection is made.

menu-driven diskette. A software system that enables a user to load a selection from the menu of a diskette using only one keystroke.

microware (mī krō wâr). Programs for a microcomputer.

output (out pōōt). The final results produced by a program.

peripheral (pə rīf ə r əl). An attachment for a computer.

examples: printer, disk drive, game paddles, etc.

printout (prin t out). A listing or picture on paper made by a printer.

printer (prin tər). A machine that receives signals from a computer and prints out hard copy.

program (prō grām). Instructions to a computer that tells it what to do, how to do it, and what to do with the results.

programmer (prō grām ə r). A person who writes and tests computer programs.

prompt (prŏmpt). A question the computer asks.

prompt character. A symbol that indicates that the computer is looking for input from the user.

example: The “?” or the cursor.

random access memory (RAM). Replaceable information and instruction created for or with a microcomputer.

read only memory (ROM). Permanent information and instructions built into the microcomputer.

RETURN key. The key a user presses when input is finished.

screen (skrĕn). The place where you see words and images on a computer. The cathode ray tube.

simulation (sim yŏŏ lā shən). To represent the functioning of another system by the execution of a computer program.

software (sŏft wār). Prepackaged program(s) for a computer.

space bar. The long narrow bar at the bottom of the keyboard. When depressed, it generates a blank character on the display screen.

storage (stŏr ij). The place where information is stored in a computer system. Can be RAM, ROM, disk, tape etc. Takes in information, holds, and at a later time, returns the information.

syntax (sĭn ŭks). Formal rules for how a computer program is written in a specific computer language.

tape deck. A machine for exchanging information between a cassette tape and a computer. A cassette player used with a computer.

terminal (tĭr mē nəl). A machine that allows a user to “talk” with a computer at a location remote from the CPU.

track (trăk). A complete circle on a diskette where information is recorded.

variable (vār e ə bel). A letter, or letters, or a letter and a number, that stand for a numeric value and can always be changed.

Example: Z might sometimes equal 7 ($Z + 3 = 10$)

Z might sometimes equal 4 ($Z - 2 = 2$)

write (rit). To make a permanent record of information for the computer.

writing (rĭ ting). The action of the computer when it saves (records) information on storage, as onto a diskette or cassette.

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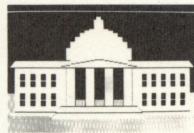
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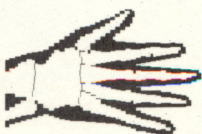
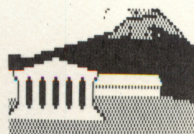
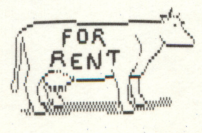
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